

SEE-GRID

Deploying a Grid-enabled eInfrastructure in SE Europe

www.see-grid.org



Data Sources: EC, EGEE, SEEGRID, SEEREN

The SEE-GRID initiative is co-funded by the European Commission under the FP6 Research Infrastructures contract no. 002356

What is GRID?



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- “Coordinated resource sharing and problem solving in dynamic, multi-institutional virtual organizations” (I.Foster)
 - Resources are controlled by their owners
 - The Grid infrastructure provides access to collaborators
- A Virtual Organization is:
 - People from different institutions working to solve a common goal
 - Sharing distributed processing and data resources
- Enabling People to Work Together on Challenging Projects
 - Science, Engineering, Medicine...
 - Public service, commerce...
- The Grid could be the “new age” Internet
 - ‘[The Grid] intends to make access to computing power, scientific data repositories and experimental facilities as easy as the Web makes access to information.’, *UK PM, 2002*

The GRID vision



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- On one hand:
 - Researchers/employees perform their activities regardless of geographical location, interact with colleagues, share and access data
- On the other hand:
 - Scientific instruments and experiments provide huge amount of data, incl. national databases
- And in the middle:
 - **The Grid:** networked data, processing centres and "middleware" software as the "glue" of resources.

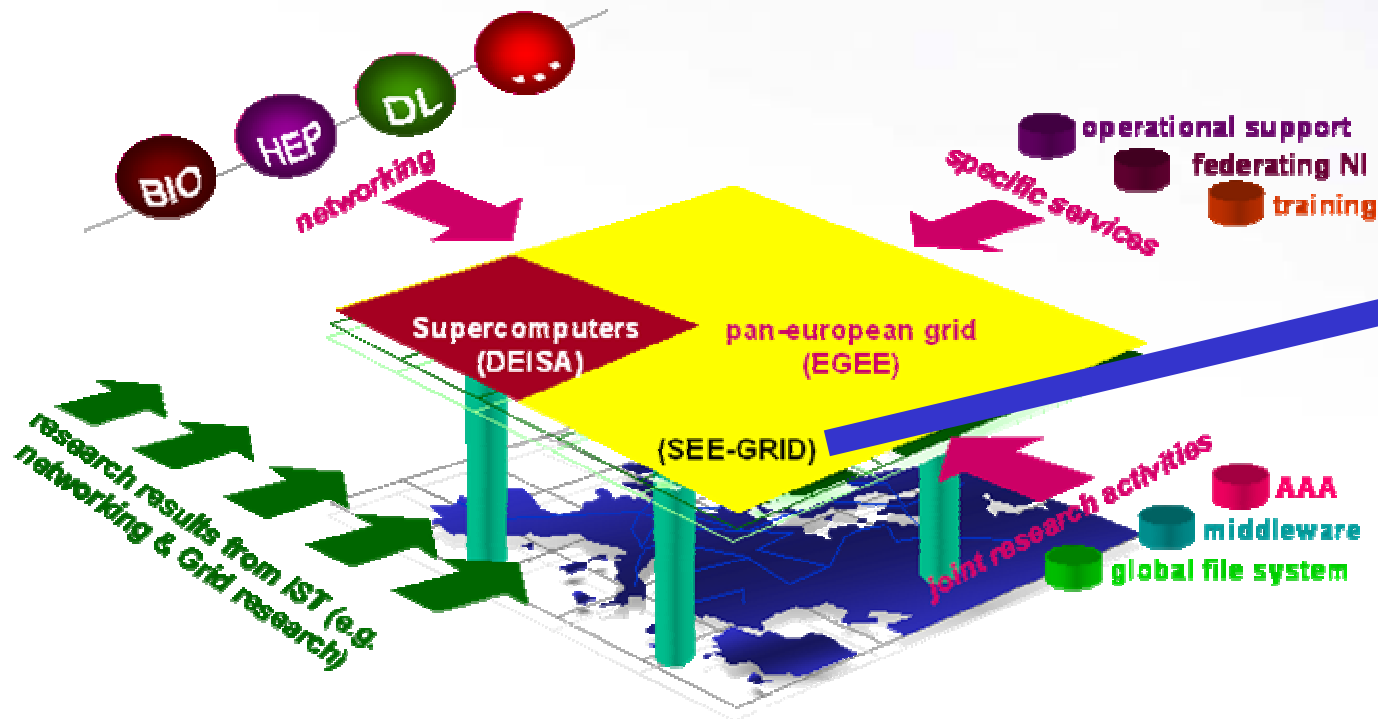
The SEE-GRID vision



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Contribute to building up a Pan-EU eInfrastructure by expanding the eInfrastructure inclusion into South-East Europe



Project snapshot



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Project name:	South Eastern European Grid-enabled eInfrastructure Development
Project Acronym:	SEE-GRID
Call Identifier:	FP6-2002-Infrastructures-2
Contract No.:	FP6-RI-002356
Project type:	Specific Support Action (SSA)
Start date:	01/05/2004
Duration:	24 months
Total Budget:	1,215,000 €
Funding from the EC:	972,000 €
Total Effort:	389 person-months
Project web-site:	www.see-grid.org



Project members



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Contractors

● GRNET (Co-ord.)	Greece
● CERN	Switzerland
● SZTAKI	Hungary
● IPP-BAS	Bulgaria
● ICI	Romania
● TUBITAK	Turkey
● INIMA	Albania
● BIHARNET	Bosnia-Herzegovina
● UKIM	FYROM
● UOB	Serbia-Montenegro
● RBI	Croatia

Third Parties

- 18 SEE universities and research institutes

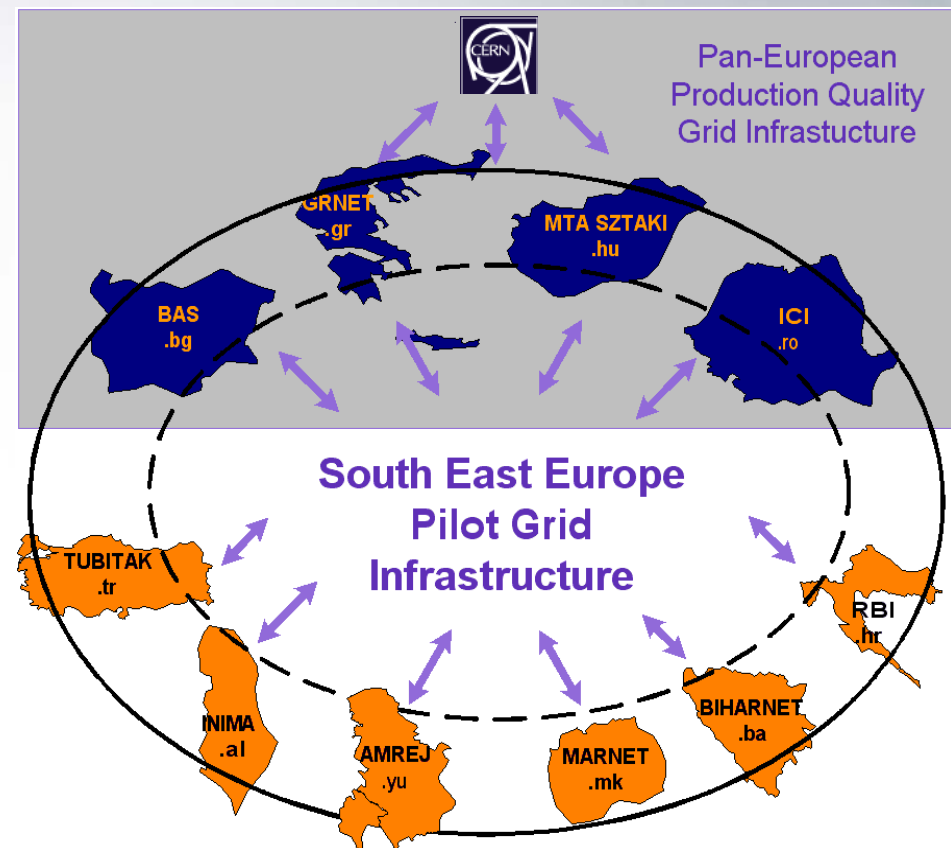
SEE-GRID mission



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- *Integrate SEE NGIs in the Pan-EU and worldwide Grid initiatives*
 - Establish a seamless and interoperable pilot-Grid infrastructure that will expand and support the ERA.
 - Allow smaller, less-resourced sites to access computing power that would otherwise be unaffordable.
 - Ease the digital divide and release the scientific & productive talents of the region



Technical Objectives



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- Migrate and test Grid middleware components and APIs developed by pan-European and national Grid efforts in the regional infrastructure.
- Deploy (adapt if necessary) and test Grid applications developed by EGEE (Large Hadron Collider Computing Grid, Biomedical Grids) in the regional infrastructure.
- Develop and demonstrate an additional Grid application of regional interest (e.g. earthquake prediction, culture/heritage).
- Integrate available pilot Resource Centers of Albania, Bosnia-Herzegovina, Croatia, FYR of Macedonia, Serbia-Montenegro and Turkey into the EGEE-compatible infrastructure.
- Expand the operations and support center of the EGEE SE Europe Federation to cater for the operations in the above countries.

Creation of Awareness Objectives



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- Create a human network in the area of Grids, eScience and eInfrastructures in SE Europe and promote awareness in the region regarding Grid developments.
- Integrate incubating and existing National Grid infrastructures in all SEE-GRID countries. This will be accomplished by building upon and exploiting the infrastructure provided by GEANT and SEEREN in the region.
- Establish a dialogue at the level of policy developments for national grid initiatives and provide input to the agenda of national governments and funding bodies
- Pursue dissemination conferences, training material and demonstrations for hands-on experience, in coordination with EGEE, which will promote the project results to the private and public sector, ultimately reaching the general public.

Foundation 1: GEANT/SEEREN

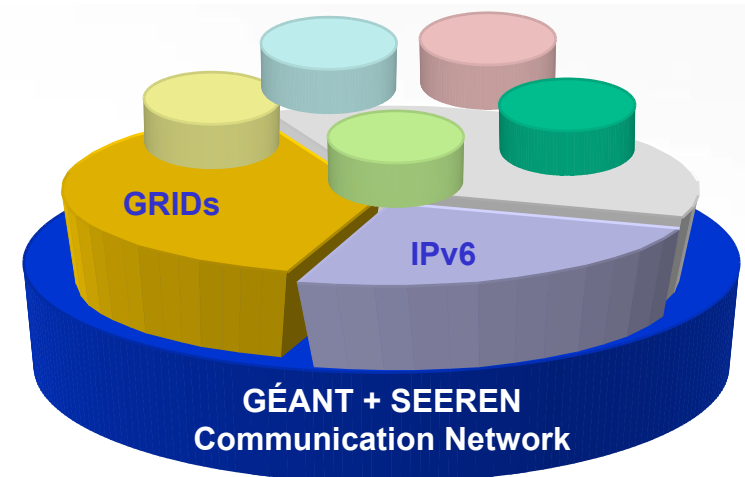
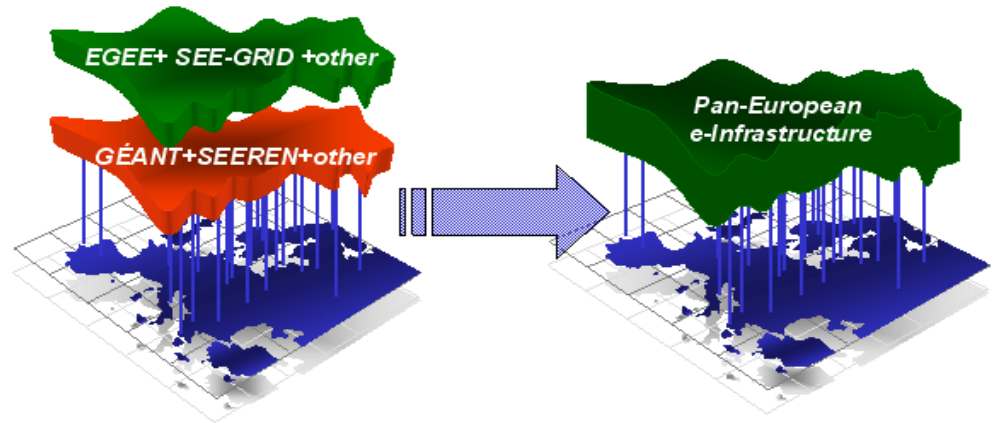
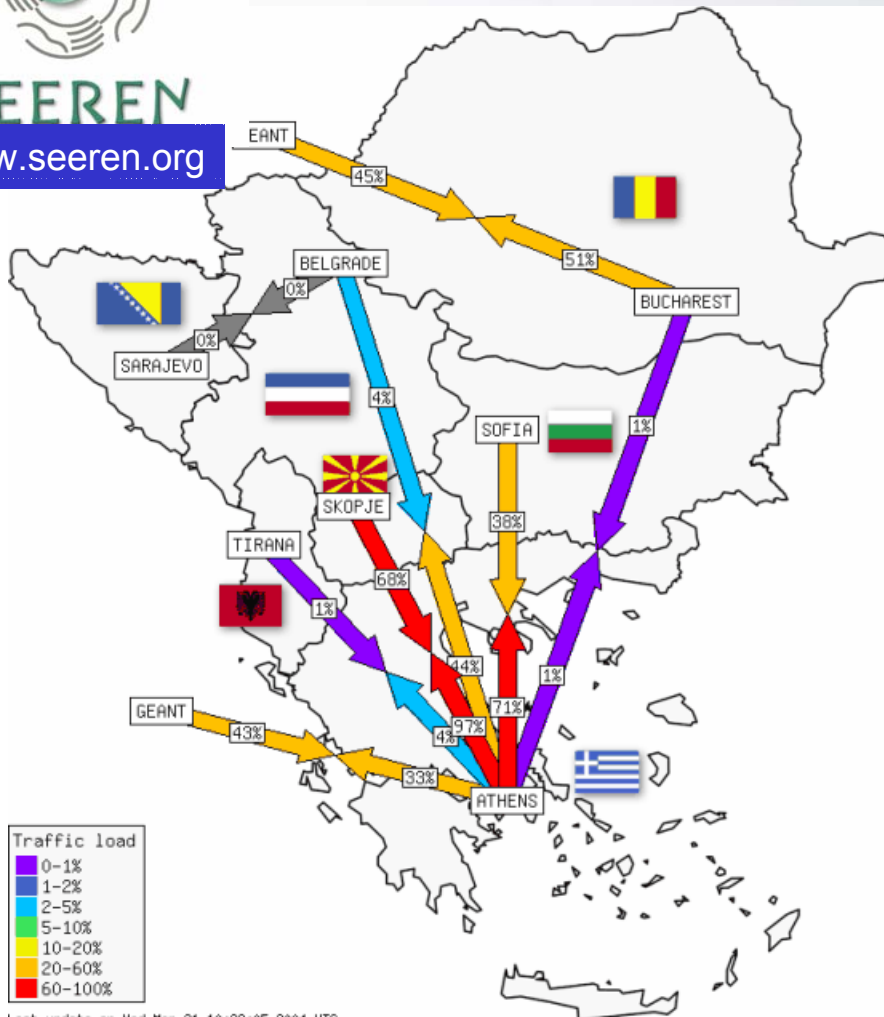


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SEEREN

www.seeren.org

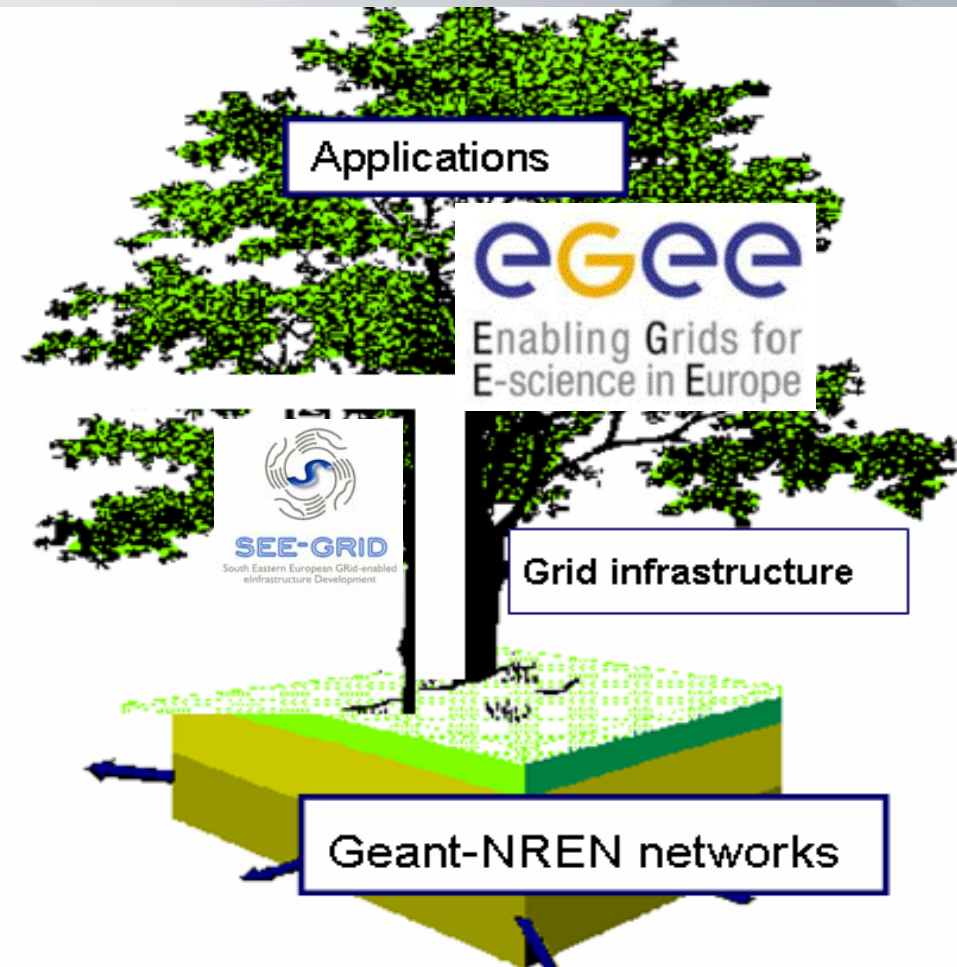


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Foundation 2: EGEE



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Source of figure: EGEE

SEEGRID – EGEE MoU



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- Migrate and test Grid middleware components and APIs developed by pan-European Grid efforts (e.g. EGEE, etc) in the regional infrastructure - SEE-GRID WP3 / EGEE SA1
- Migrate (adapt if necessary) and test Grid applications developed by EGEE (Large Hadron Collider Computing Grid, Biomedical Grids) in the regional infrastructure - SEE-GRID WP3 / EGEE NA4.
- Integrate available pilot Resource Centers of Albania, Bosnia-Herzegovina, Croatia, FYRoM, Serbia-Montenegro and Turkey into the EGEE infrastructure. Expand the operations and support center of the EGEE SE Europe Federation
- Promote awareness in the region regarding Grid developments through dissemination conferences, training material and demonstrations for hands-on experience, in coordination with EGEE, which will promote the project results to the private and public sector, ultimately reaching the general public.



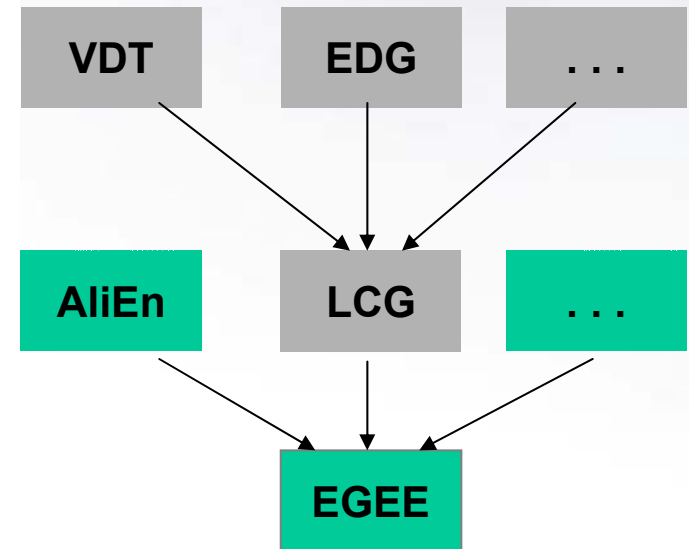
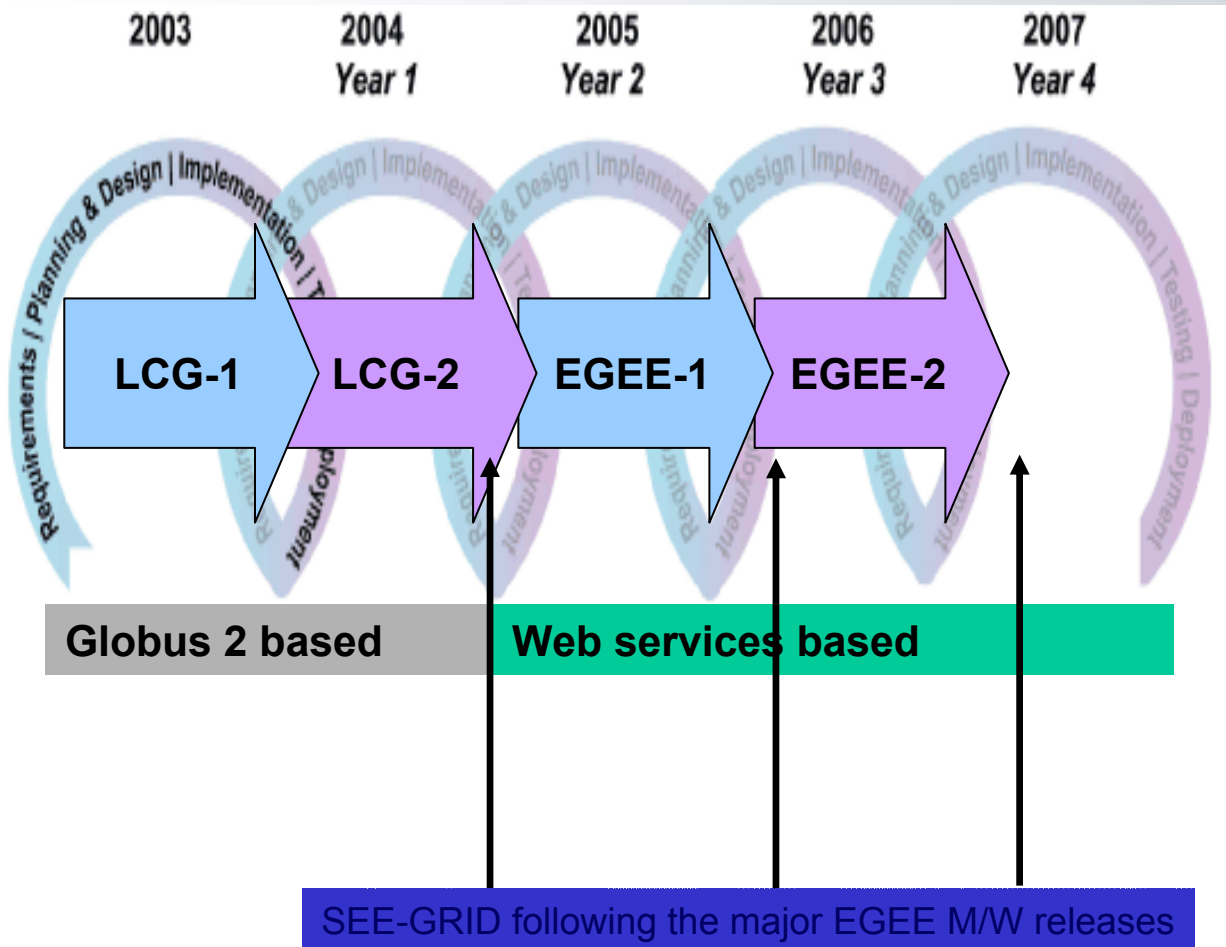
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EGEE m/w lifecycles vs. SEE-GRID



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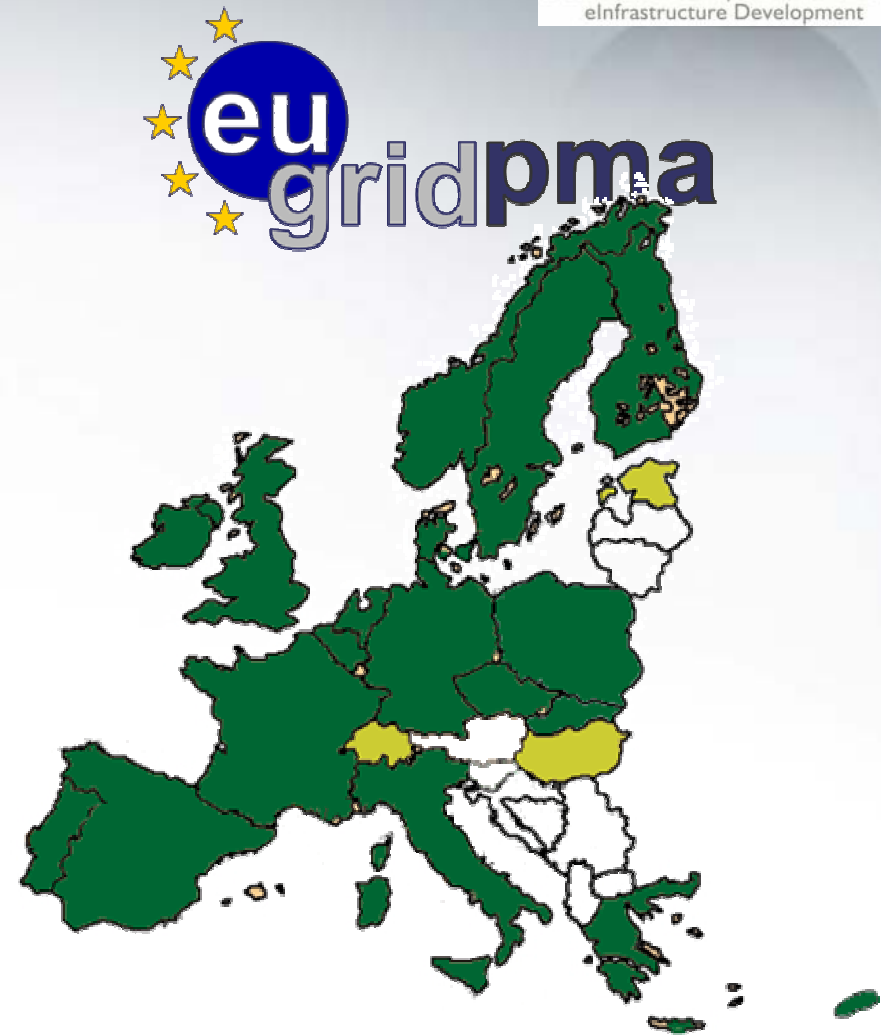
Source of figure: EGEE

EUGridPMA & SEE-GRID



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- EUGridPMA: *“a body to establish requirements and best practices for grid identity providers to enable a common trust domain applicable to authentication of end-entities in inter-organizational access to distributed resources.”*
- EUGridPMA itself does not provide identity assertions, but instead asserts that Grid certificates issued by Accredited Authorities meet or exceed relevant guidelines.
- The SEE-GRID project is a Relying Party in the EUGridPMA (along with EGEE, DEISA, and other major grid projects)
- GRNET is setting up a SEE-GRID “Catch-all” CA for the participating countries that do not have yet an EUGridPMA-accredited Grid CA
- All partners will be supported to establish their own EUGridPMA-accredited CA



SEE-GRID work organization



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● WP1

- Project management

● WP2

- Requirements capture and architectural design

● WP3

- Migrate and test Grid middleware components and APIs developed by pan-European Grid efforts (e.g. EGEE, etc) in the regional infrastructure.
- Migrate (adapt if necessary) and test Grid application components developed by EGEE (Large Hadron Collider Computing Grid, Biomedical Grids) in the regional infrastructure.

● WP4

- Integrate available pilot Resource Centers of SEE countries into the EGEE-compatible infrastructure. Expand the operations and support center of the EGEE SE Europe Federation.

● WP5

- Promote awareness in the region regarding Grid developments through dissemination conferences, training material and demonstrations for hands-on experience
- Promote the project results to the private and public sector, ultimately reaching the general public.

Milestones (end results)



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- Project management information system established (M1)
- Questionnaire online publishing mechanism (M2)
- Identified user communities (M2)
- Promotional package available (M3)
- NGIs requirements collected and analyzed (M6)
- Start operations and support center (M13)
- First migration of Grid applications (M14)
- First adaptation of m/w components, APIs and application development environment (M18)
- Demonstration labs (M21)
- Final migration of Grid applications components (M22)
- Final migration of middleware components and APIs (M24)
- Demonstration of applications (M24)
- Final SEE-GRID conference proceedings (M24)

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Next slides: Profile & Role per partner



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GRNET: Profile



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- GRNET is a state-owned corporation, under the auspices of the Greek Ministry of Development – General Secretariat for Research and Technology.
- Mission Statement
 - Provide high-quality international and national networking services to the Greek academic, research & educational community and to the public and private sector to support their research and educational activities.
 - Promote and disseminate the use of ICT in the public and private sector towards an eGovernment, eLearning and eBusiness environment.
- Role
 - Operation (VNOc) and upgrade (towards 2.5Gbps) of the National R&E Backbone Electronic Network (connecting more than 70 institutions).
 - Coordinates the development of the National Grid Infrastructure (storage & computing nodes).
 - Provision of backbone networking services to the Greek School Network (more than 6.400 schools).
 - Operation of the Athens Internet Exchange (AIX), peering of Greek commercial ISPs.
 - Development with Greek and international R&E institutions of Pan-European and Regional electronic infrastructures (Pan-European and Balkan R&E Internet Backbone, Pan-European and Balkan Grid infrastructure).
 - Introduce small-sized companies into the Internet economy, focusing on e-business and e-government applications.
 - Contributes to the National State policy-making process by planning and funding a series of activities for the introduction of Telecommunications and Information Technologies.

GRNET: Role in SEE-GRID



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- GRNET will be **leading WP1, WP2 & WP5**. In WP3 and WP4 GRNET will contribute to all the activities not with a leading role.
- GRNET will also **provide directions, feedback and guidance** in all WPs based on the experience gained by the HellasGrid internal project coordination, EGEE participation and SEEREN coordination. In this way GRNET will play the role of linchpin **liaising** these projects together.
- GRNET will be **driving the project administrative management, requirements studies and analysis and dissemination and communication**.
- GRNET will **establish and maintain the project management information system**, will maintain the contractual relationships, will be the main responsible for the **reporting to the EC** and for the preparation of cost statements and financial transactions.
- GRNET will also lead the **documentation of the integrated conclusions** from the requirements' studies and analysis and will participate in drafting the roadmaps and cookbooks.
- In WP5, GRNET will **develop and maintain the communication infrastructure** and will **lead the preparation of the promotional package, demonstration labs and seeking additional sources of funding**.

CERN: Profile



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- CERN is the European Organization for Nuclear Research (www.cern.ch)
- The world's largest particle physics laboratory
 - ... where the web was born!
- One of Europe's first truly international joint ventures
- CERN explores what matter is made of, and what forces hold it together
- CERN hosts High-Energy Physics Experiments
 - Builds particle accelerators in a 28 Km circumference tunnel
- Leader in Grid middleware development and deployment
 - Co-ordinator of the EGEE project
- Now includes 20 Member States
 - CERN is operated by 2700 permanent staff coming from the 20 member states.
 - It has a yearly budget of about 1000 M CHF.

CERN: Role in SEE-GRID



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- Provide guidance to ensure that the research and the progress which will take place in the region will keep pace with the developments in the rest of Europe
- Assisted by the common partners to EGEE (GRNET, CLPP, ICI, and SZTAKI) and other consortium members, will disseminate experience and know-how to the region
- Leading partner in the requirements capture phase
- Help in assessing the current Grid knowledge and expertise in the region
- Assess the current and future infrastructure needs of the NGIs involved
- Provide the state-of-the-art in e-Infrastructure components
- Propose technological solutions and roadmaps for the NGIs
- Contribute to the migration of the Grid middleware components
- Assist the NGIs in accessing the EGEE developed applications
- Contribute in transferring the training material to the Grid communities in the region
- Open wherever possible the EGEE training events to the SEE-GRID partnership

IPP-BAS: Profile



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- The Institute for Parallel Processing (IPP) of the Bulgarian Academy of Sciences (BAS) was founded in 1985.
- IPP has a leading position among the scientific institutions in Bulgaria in the fields of computer science and scientific computations. It performs research, consultations, projects and high quality education.
- The activities of IPP are oriented mainly to the creation and usage of advanced mathematical and computer technologies, including Grid technologies. The applied activities include such fields as ecology, engineering, computer technology, information systems, etc.
- IPP employs 65 scientists (32 full and associate professors, 33 research assistants) and 20 university educated specialists
 - about 140 scientific papers published every year, 100 of them in refereed journals and proceedings of high-quality international conferences

IPP-BAS: Role in SEE-GRID



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- WP2: Requirements studies and analysis, roadmaps and cookbooks
 - Assess the current Grid projects
- WP3: Grid middleware components, APIs and applications migration and integration
 - Closely cooperate with the EGEE project
 - Grid application of interest – Grid-oriented Monte Carlo and quasi-Monte Carlo Methods
- WP4: Network resource provision and operation support
 - Closely cooperate with the EGEE project
 - Aid use of the national Grid infrastructure
 - Aid the establishment of Grid infrastructure in the region
- WP5: Training, dissemination and communication
 - Organize and/or participate in conferences and workshops
 - Disseminate the project result

ICI: Profile



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- **Mission:**

To actively participate in science and technology as the leading Romanian research-development and innovation centre in IT&C
- **Major fields of expertise:**

knowledge engineering, database systems, computer networking, grid computing, software engineering, quality assurance in IT, business process re-engineering, decision support systems, computer interfaces, computer integrated manufacturing, mathematical modeling, simulation and optimization, multimedia, web technologies
- **Professional departments:**
 - Research and Development
 - Complex Systems and Applications
 - Technology Transfer and IT Services
 - Administration of Romanian National R&D Network (RNC)
- **Qualifications**
 - Ranked first among R & D Romanian organizations, in the EC survey "*Impact of the enlargement of the European Union towards the associated central and eastern European countries on RTD - innovation and structural policies*"
 - Member of Romanian Association of Electronic and Software Industry - ARIES
 - Certified ISO 9001:2000
 - Editor of the quarterly *Romanian Journal of Information Technology and Automatic Control*

ICI : Role in SEE-GRID



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- Project WP4 Leader
 - manage all the activities of this work package and ensure that the schedule is maintained and the objectives are fulfilled.
- Contribute to all other WPs within the SEE-GRID project in full compliance with its participation in the EGEE project.
- Coordinate the contributions provided by other members of the RoGRID consortium, which are active in the SEE-GRID project:
 - University "Politehnica of Bucharest (together with RoEduNet)
 - National Institute for R&D in Physics and Nuclear Engineering Bucharest
 - National Institute for Aerospace Research Bucharest
 - University of Bucharest.

TÜBİTAK: Profile



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- Founded in 1963, The Scientific and Technical Research Council of Turkey (TÜBİTAK) is the supreme organization put in charge of promoting, developing, organizing and coordinating research and development in the fields of exact sciences in Turkey in line with the National targets of economic development and technical progress.
 - functions under the fold of the Prime Ministry with adequate administrative and financial autonomy.
- TUBITAK is leading and coordinating the activities of independent research communities in high performance computing towards a Turkish Grid, representing the Tr-Grid National Initiative.
- Key institutions include the Bilkent University, the Bogazici University, the Istanbul Technical University.
- These research groups have been building expertise on Grid middleware components such as
 - resource discovery and data delivery
 - job scheduling and co-allocation
 - replication management
 - resource sharing and coordination.

TÜBİTAK: Role in SEE-GRID



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- TUBITAK will take responsibility in identification and documentation of the end-user communities and applications' needs in Turkey.
- TUBITAK will contribute to selection and tuning of the appropriate middleware solutions for the selected EGEE applications as well as the applications to be determined as a result of the questionnaire of WP2.
- To ensure stability, interoperability and efficient use of underlying grid resources, the know-how and expertise will be developed and provided to the end-users.
- An active role will be taken in selection, development and deployment of the grid application of regional interest.
- TUBITAK will also be involved in providing usage statistics and generating assessment reports evaluating the SEE-GRID infrastructure.

SZTAKI: Profile



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- SZTAKI has a leading role in research and prototyping of new Grid technologies in Hungary.
- It actively participates in Hungarian Grid activities including the DemoGrid, SuperGrid, JiniGrid projects as well as the Hungarian Cluster Grid Initiative.
- SZTAKI has three main divisions:
 - Computer Networks and Services Division
 - Development Division
 - Autonomous Research Division.
- The Laboratory of Parallel and Distributed Systems belongs to the Autonomous Research Division (AKE) which was founded in 1991 with the main focus on basic research related to the C3I (Computing, Control, Communication, and Intelligence) quadruple of the Institute's profile.
- The main research areas of the LPDS include supercomputing, cluster computing, metacomputing, Grid computing and graphical programming environments.
- LPDS has a long running experience in EU projects
 - Participated in SEPP (No. CP 93: 5383), HPCTI (No. CIPA-C193-0251) and AHMED (No. 960144) COPERNICUS projects, in the WINPAR (No. 23516) ESPRIT project, as well as in two TEMPUS projects (S_JEP-08333-94, S_JEP 12495-97).
 - LPDS currently participates in several major European Grid projects (DataGrid, GridLab, APART-2) where its main task is to create a performance monitoring infrastructure for the Grid.

STZAKI: Role in SEE-GRID



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- Project WP3 Leader
 - manage all the activities of this work package and ensure that the schedule is maintained and the objectives are fulfilled.
- SZTAKI will contribute to all the other WPs within the SEE-GRID project in full compliance with its participation in the EGEE project.
- In WP2 SZTAKI will actively participate in the assessment of existing Grid projects (DATAGRID, CROSSGRID, EGEE, etc.) and National initiatives (Hungarian ClusterGrid, etc.).
- In WP4 SZTAKI will provide its GridSphere based portal technology adopted from the GridLab project and developed for the Hungarian Grid projects.
- In WP5 SZTAKI will organize tutorials/workshops/courses on Grid middleware components, Grid systems (for example EDG, EGEE, GT2, GT3, Condor, GAT, Hungarian ClusterGrid, JiniGrid, etc.), Grid application development, as well as how to build and maintain Grid systems.
- SZTAKI will contribute in preparing all kind of training and eScience knowledge dissemination activities together with the other partners and create the human resources and infrastructure facilities for Grid application and eScience technology.
- Also SZTAKI will coordinate the contributions provided by other members of the MGKK consortium, which are active in the SEE-GRID project. SZTAKI will transfer its significant experiences on Grid middleware, Grid systems and Grid application development gained in the Hungarian and European Grid projects to the beneficiary countries of the SEE-GRID project.

ASA-INIMA: Profile



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- The Academy of Sciences of Albania comprises of many institutes active in the field of science and technology
- A member of ASA is the Institute of Informatics and Applied Mathematics (INIMA)
 - founded as Center of Mathematical Calculus in 1971 and as institute in 1985 physically and officially in 1986.
- INIMA pursues the development of computer science, computer networks and mathematical applications in different fields of human activity, as in economy, engineering, medicine, etc, and is formally charged with the responsibility for the state network. Main fields of activity for INIMA include:
 - Realization of information systems such as application software, graphical and GIS applications, databases, spreadsheets, image and multimedia data processing, distributed applications. Design and implementation of information systems infrastructure and data transmission networks, running operating systems as Ms-Windows, Unix, and network systems based on TCP/IP and Microsoft Networks. Development and distribution of Internet services.
 - Application of mathematical methods such as numerical analysis and finite elements, optimisation, mathematical statistics etc. applied in domains as geology, geophysics and seismic, static and dynamic structure analysis, energy resource planning etc.
 - Training of different categories of people about using computers, application software and Internet services.

ASA-INIMA: Role in SEE-GRID



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- A focal point for GRID activities in Albania
- Identify potential users, their conditions and requirements in Albania
- Create awareness between potential users in Albania and coordinate their initiatives
- Contribute for building-up possible GRID experiments in Albanian reality
- Support local GRID activities operating necessary local infrastructure
- Participate in regional integration of GRID pilot applications and infrastructure
- Carry out evaluation of results of GRID pilot applications in Albania
- Participate in dissemination activities related with regional GRID applications

BIHARNET: Profile



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- BIHARNET is B&H Academic and Research Network
 - A legal body comprised of the University of Banja Luka, the University “Džemal Bijedić” in Mostar, The University of West Mostar, the University of Sarajevo and the University of Tuzla
 - The above entities established BIHARNET network and BIHARNET Center, which is responsible for managing of network, on February 12, 1998.
 - As soon as new universities in Srpsko Sarajevo and Bihac have been established they become members of BIHARNET.
- Institutions (users) connect their local networks with the BIHARNET network by leased lines and the corresponding communications equipment.
- The devices located on their side, such as modems, the telephone line and the router, are in their possession, though, as a rule, the BIHARNET Center operates them, whereas the user always operates the local network.

BIHARNET: Role in SEE-GRID



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- BIHARNET will contribute to the following:
 - activities of establishing the B&H common "human network"
 - transfer of know-how
 - organisation of different type of the training
 - increasing awareness of SEE-GRID importance among potential users in the country and coordination of their initiatives
 - contribution to building-up possible GRID experiments in Bosnian reality
 - supporting local GRID activities operating necessary local infrastructure
 - participation in regional integration of GRID pilot applications and infrastructure
 - participation in dissemination activities related to regional GRID applications.

UKIM: Profile



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- The Ss Cyril and Methodius University in Skopje (UKIM) will be involved in the project through its organizational unit Macedonian Academic and Research Network (MARNET) that was founded in 1994 by a Decision of the University Board and endorsed by the Ministry of Science.
- Mission of MARNET
 - Provide international and national networking services to the Macedonian academic research & educational community and support to their research and educational activities.
 - Promote and disseminate the use of ICT in the academic and research sector
- Role of MARNET
 - Connection to the international networks with basic IP provision;
 - Maintain and management of the national DNS;
 - International memberships;
 - National academic network policy and development

UKIM: Role in SEE-GRID



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- UKIM will coordinate and represent the country GRID community in the SEE-GRID project and integrate research potential establishing the "human network" in the GRID area.
- The workgroup at the Institute of Informatics, at the Faculty of Sciences and Mathematics is already experimenting with the Grid middleware technologies and has extended current course in computer networks with the introduction the Grid technologies to the students, providing also better awareness of Grids applications to the academic community.
- Similar activities have been carried out at the Faculty of Electrical Engineering that established two Laboratories as a platform for testing Grid middleware components and applications.
- The workgroups from the both Faculties will participate in establishing the SEE-GRID pilot test bed working on selection, installation and tuning of the GRID middleware.

UOB: Profile



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- The University of Belgrade (UOB) manages the Academic and Research Network of Yugoslavia (AMREJ) whose main task is the development, operation and management of the communication and information network for education and research.
- It is supported by the Federal secretariat for Development and Science, the Ministry of Science, Technologies and Development and Ministry of Education and Sport of Serbia and the Ministry of Science and Education of Montenegro.
 - The Board of Directors managing the network consists of Directors of the University Computing Centres of all Universities in S&M.
- Belgrade University Computing Center is the main network operation center of the network, also coordinating the international cooperation and technical network development.
 - The Director of Belgrade University Computing Center is representing AMREJ in international cooperation.

UOB: Role in SEE-GRID



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- The main objective for UOB in SEEGRID, via its management and participation of the National Academic and Research Network (AMREJ), is to establish a GRID infrastructure on the gigabit research and education network of the country.
- The plan is to establish GRID access servers at the following locations:
 - Belgrade University Computing Center, Institute for Physics, university computing centers in Novi Sad, Nis, Kragujevac and at the Ministry of Science and Environmental Protection.
 - Through the project, Globus toolkit will be installed at all the mentioned locations.
- The collaboration GRID technologies, including the use of GridSphere based portals, will be implemented on the network.
- The main area where existing computational clusters will be used through GRID middleware will be Physics, but the introduction of GRID technologies is planned in additional areas like medical research, genetics, chemistry and meteorology.
- Belgrade University Computing Center and Institute for Physics will organize tutorials/workshops/courses on Grid middleware components.
- Development of specific applications adding functionality to the Globus toolkit and GridSphere portals is also planned.

RBI: Profile



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- Ruđer Bošković Institute (RBI) was founded in 1950 as a centre for scientific research.
- Today it is a largest scientific Institute in Croatia.
- The Institute has 756 employees with 339 Ph.D. and 54 M.Sc.'s.
- Present research activities are organized within 11 departments and 3 Centres.
 - Departments:
 - Theoretical Physics,
 - Experimental Physics,
 - Materials Physics,
 - Electronics,
 - Physical Chemistry,
 - Organic Chemistry and Biochemistry,
 - Materials Chemistry,
 - Molecular Biology (Genetics),
 - Molecular Medicine,
 - Marine and Environmental Research, and
 - Laser and Atomic Research and Development.
 - Centres:
 - Center for Marine Research,
 - Center for Informatics and Computing
 - Center for Nuclear Magnetic Resonance

RBI: Role in SEE-GRID



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- WP3, WP4, and WP5
 - HPC cluster technology - WP 3
 - Hardware architecture implementation
 - Cluster distribution program package
 - Monitoring and remote control
 - HPC knowledge base
 - Application development - WP 4
 - Pilot application development
 - Parallel programming application tools
 - Application GRID portal development
 - Application testbed
 - Knowledge and technology dissemination
 - Courses/Workshops/Conferences with other SEE GRID members A5.3, A5.4